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ABSTRACT

This document, which is intended for use by community and junior colleges throughout Mississippi, contains curriculum frameworks for the course sequences in the civil technology programs cluster. Presented in the introductory section are a description of the program and suggested course sequence. Section I lists baseline competencies, and section II consists of outlines for each of the courses in the sequence. Twelve civil technology courses are as follows: road design and construction methods and materials; route surveying; road construction plans and specifications; land surveying lab; legal principles of surveying; global positioning satellite/geographical information system surveying; advanced surveying practices; soil mechanics; concrete and hot-mix asphalt testing; water and water distribution; special project; and work-based learning in civil technology. Nine related vocational-technical courses include the following: fundamentals of drafting, principles of computer-aided drafting (CAD), intermediate CAD, elementary surveying, advanced CAD, structural drafting, mapping and topography, professional development, and real property I. Each course outline contains some/all of the following: course name and abbreviation; course classification; course description; prerequisites; and competencies and suggested objectives. Recommended tools and equipment are listed in section III. Appended are lists of related academic topics and workplace skills for the 21st century and student competency profiles for both courses. (YLB)

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Mississippi Curriculum Framework for Civil Technology

ED 397 332

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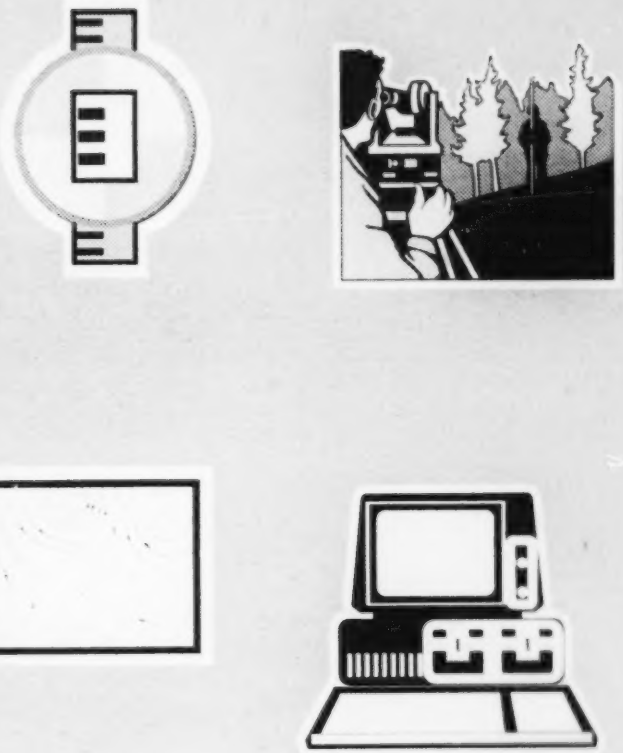

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MISSISSIPPI

CURRICULUM FRAMEWORK

FOR

CIVIL TECHNOLOGY

(Program CIP: 15.0201 – Civil Engineering/Civil Technology)

POSTSECONDARY PROGRAMS 1996

July 30, 1996

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FOREWORD

In order to survive in today's global economy, businesses and industries have had to adopt new practices and procedures. Total quality management, statistical process control, participatory management, and other concepts of high performance work organizations are practices by which successful companies survive. Employers now expect their employees to be able to read, write, and communicate effectively; solve problems and make decisions; and interact with the technologies that are prevalent in today's workplace. Vocational-technical education programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflects these changes in the workplace and a number of other factors that impact on local vocational-technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U. S. Departments of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Each postsecondary program of instruction consists of a program description and a suggested sequence of courses which focus on the development of occupational competencies. Each vocational-technical course in this sequence has been written using a common format which includes the following components:

- Course Name - A common name that will be used by all community/junior colleges in reporting students.

- Course Abbreviation - A common abbreviation that will be used by all community/junior colleges in reporting students.

- Classification - Courses may be classified as:
  - Vocational-technical core - A required vocational-technical course for all students.
  - Vocational-technical elective - An elective vocational-technical course.
  - Related academic course - An academic course which provides academic skills and knowledge directly related to the program area.
  - Academic core - An academic course which is required as part of the requirements for an Associate degree.

- Description - A short narrative which includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester.

- Prerequisites - A listing of any prerequisite courses that must be taken prior to or on enrollment in the course.

- Competencies and Suggested Objectives - A listing of the competencies (major concepts and performances) and of the suggested student objectives that will enable students to demonstrate mastery of these competencies.

The following guidelines were used in developing the program(s) in this document and shcuild be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75 percent of the time allocated to each course. For example, in a four semester hour course consisting of 30 hours lecture and 120 hours of laboratory activities, approximately 22 hours of lecture and 90 hours of lab should be taken by the competencies and suggested objectives identified in the course framework. The remaining 25 percent of each course should be developed at the local district level and may reflect:
  - Additional competencies and objectives within the course related to topics not found in the State framework, including activities related to specific needs of industries in the community college district.
  - Activities which develop a higher level of mastery on the existing competencies and suggested objectives.
  - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed/revised.
  - Activities which implement components of the Mississippi Tech Prep initiative, including integration of academic and vocational-technical skills and coursework, school-to-career transition activities, and articulation of secondary and postsecondary vocational-technical programs.
  - Individualized learning activities, including worksite learning activities, to better prepare individuals in the courses for their chosen occupational area.

- Sequencing of the course within a program is left to the discretion of the local district. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.

- Programs that offer an Associate of Applied Science degree must include a minimum 15 semester credit hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:
  - 3 semester credit hours — Math/Science Elective
  - 3 semester credit hours — Written Communications Elective
  - 3 semester credit hours — Oral Communications Elective
  - 3 semester credit hours — Humanities/Fine Arts Elective
  - 3 semester credit hours — Social/Behavioral Science Elective

  It is recommended that courses in the academic core be spaced out over the entire length of the program, so that students complete some academic and vocational-technical courses each semester. Each community/junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- In instances where secondary programs are directly related to community and junior college programs, competencies and suggested objectives from the high school programs are listed as Baseline Competencies. These competencies and objectives reflect skills and knowledge that are directly related to the community and junior college vocational-technical program. In adopting the curriculum framework, each community and junior college is asked to give assurances that:
  - students who can demonstrate mastery of the Baseline Competencies do not receive duplicate instruction, and
  - students who cannot demonstrate mastery of this content will be given the opportunity to do so.

- The roles of the Baseline Competencies are to:
  - Assist community/junior college personnel in developing articulation agreements with high schools, and
  - Ensure that all community and junior college courses provide a higher level of instruction than their secondary counterparts

- The Baseline Competencies may be taught as special "Introduction" courses for 3-6 semester hours of institutional credit which will not count toward Associate degree requirements. Community and junior colleges may choose to integrate the Baseline Competencies into ongoing courses in lieu of offering the "Introduction" courses or may offer the competencies through special projects or individualized instruction methods.

- Technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

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CIVIL TECHNOLOGY

PROGRAM DESCRIPTION

This program prepares a person for entry level positions in the civil engineering field. The curriculum includes surveying, principles of road construction, and general construction practices.

The graduate is prepared to work with the civil engineer and surveyor in the performance of general engineering practices which may include design; drawing and interpreting working drawings; determining equipment, materials, and labor required to complete a project; and performing various tests required for construction. Up-to-date equipment usage is stressed, including the surveying computer and electronic distance measuring devices.

A minimum of 64 semester credit hours is required to receive an Associate of Applied Science in Civil Technology. Students who complete a minimum of 32 semester credit hours in the program may be eligible to receive a certificate in Civil Technology.

CIVIL TECHNOLOGY

SUGGESTED COURSE SEQUENCE*

Baseline Competencies for Civil Technology**

FIRST YEAR

4 sch	Fundamentals of Drafting (DDT 1114)	3 sch	Technical Elective
3 sch	Elementary Surveying (DDT 1413)	4 sch	Route Surveying (CIT 1114)
3 sch	Road Design and Construction Methods and Materials (CIT 1213)	3 sch	Road Construction Plans and Specifications (CIT 1223)
3 sch	Principles of CAD (DDT 1313)	3 sch	Math Elective
3 sch	Math/Science Elective	3 sch	Written Communications Elective
16 sch		16 sch	

SECOND YEAR

4 sch	Land Surveying Lab (CIT 2434)	3 sch	Technical Elective
3 sch	Technical Elective	4 sch	GPS/GIS Surveying (CIT 2424)
3 sch	Legal Principles of Surveying (CIT 2113)	3 sch	Mapping and Topography (DDT 2423)
3 sch	Social/Behavioral Science Elective	3 sch	Technical Elective
3 sch	Oral Communications Elective	3 sch	Humanities/Fine Arts Elective
16 sch		16 sch	

* Students who lack entry level skills in math, English, science, etc. will be provided related studies.

** Baseline competencies are taken from the high school General Drafting program. Students who can document attainment of these competencies should not receive duplicate instruction. Students who cannot demonstrate attainment will be required to do so.

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TECHNICAL ELECTIVES - CIVIL TECHNOLOGY

3 sch	Intermediate CAD (DDT 1323)
3 sch	Advanced CAD (DDT 2343)
3 sch	Structural Drafting (DDT 2233)
4 sch	Advanced Surveying Practices (CIT 2124)
3 sch	Soil Mechanics (CIT 2313)
3 sch	Concrete and Hot-Mix Asphalt Testing (CIT 2413)
3 sch	Water and Water Distribution (CIT 2513)
1-3 sch	Special Project [CIT 291(1-3)]
1-6 sch	Work-Based Learning in Civil Technology [CIT 292(1-6)]
3 sch	Professional Development (BOT 1213)
3 sch	Real Property I (LET 2453)

SECTION I:

BASELINE COMPETENCIES

BASELINE COMPETENCIES FOR CIVIL TECHNOLOGY

The following competencies and suggested objectives are taken from the publication *Mississippi Curriculum Framework for General Drafting*. These competencies and objectives represent the baseline which was used to develop the community/junior college Civil Technology courses. Students enrolled in postsecondary courses should either (1) have documented mastery of these competencies, or (2) be provided with these competencies before studying the advanced competencies in the Civil Technology program.

Baseline competencies may be integrated into existing courses in the curriculum or taught as special "Introduction" courses. The "Introduction" courses may be taught for up to six semester hours of institutional credit and may be divided into two courses. If the Baseline Competencies are to be taught as "Introduction" courses, each course should be at least 3 credit hours. The following course number(s) and description should be used:

Course Name(s): Introduction to Civil Technology, Introduction to Civil Technology I, or Introduction to Civil Technology II

Course Abbreviation(s): CIT 100(3-6), CIT 1013, CIT 1023

Classification: Vocational-Technical Core

Description: These courses contain the baseline competencies and suggested objectives from the high school General Drafting curriculum which directly relate to the community college Civil Technology program. The courses are designed for students entering the community college who have had no previous training or documented experience in the field. (3-6 semester hours based upon existing skills for each student. May be divided into 2 courses for a maximum total of 6 hours of institutional credit.)

Competencies and Suggested Objectives:

1. Describe local program and vocational center policies and procedures.
   a. Describe local program and vocational center policies and procedures including dress code, attendance, academic requirements, discipline, and transportation regulations.

   Related Academic Topics (See Appendix A): C1, C4, C6
   Workplace Skills (See Appendix B): WP2, WP3, WP6
2. Describe employment opportunities and responsibilities.
   a. Describe employment opportunities including potential earnings, employee benefits, job availability, places of employment, working conditions, and educational requirements.

b. Describe basic employee responsibilities.

Related Academic Topics (See Appendix A): C1, C4, C6
Workplace Skills (See Appendix B): WP2, WP3, WP6

3. State procedures of leadership used to reach an agreement in an orderly manner and personal development opportunities provided students by the Vocational Industrial Clubs of America (VICA).
   a. State procedures of leadership used in organizational meetings to reach an agreement in an orderly manner.
   b. Describe the purposes of VICA.

   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP3, WP6
4. Identify desirable personal behavior and characteristics.
   a. Identify desirable personality traits when serving the public.
   b. Identify desirable personality traits when communicating with employees, supervisors, and other employees.
   c. Identify desirable characteristics of the personal work ethic.

   Related Academic Topics (See Appendix A): C4, C5, C6
   Workplace Skills (See Appendix B): WP2, WP3, WP6
5. Identify legal requirements for participation in the occupation.
   a. Describe ways to avoid legal liability problems in the occupation.

   Related Academic Topics (See Appendix A): C3, C4, C6
   Workplace Skills (See Appendix B): WP4, WP6
6. Describe personal safety rules for working in the drafting industry.
   a. Identify and apply terms and definitions for safety.
   b. Identify OSHA inspections and citations.
   c. Identify accidents including causes and prevention.
   d. Identify general safety procedures.
   e. Identify causes of electrical hazards.
   f. Identify proper methods for moving heavy items.
   g. Identify and apply emergency first aid, if necessary.

   Related Academic Topics (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3
7. Match drafting occupation job titles with qualifications and responsibilities and identify areas of specialization in the drafting profession.
   a. Match drafting occupation job titles with qualifications and responsibilities.
   b. Identify areas of specialization in the drafting profession.

   Related Academic Topics (See Appendix A): C1, C4, C5, S8
   Workplace Skills (See Appendix B): WP2
8. Describe goals of technical drawing including accuracy, acceptable technique, neatness, and speed.
   a. Describe the goals of technical drawing.

   Related Academic Topics (See Appendix A): C1, C4, C5
   Workplace Skills (See Appendix B): WP2, WP3

9. Identify and demonstrate drafting tools and identify media.
   a. Identify drafting tools.
   b. Operate blueprint machine.
   c. Match media and reproduction terms.
   d. Interpret architect, engineering, and metric scale units.
   Related Academic Topics (See Appendix A): C1, M1, M4
   Workplace Skills (See Appendix B): WP2, WP5
10. Demonstrate the ability to describe the rules of lettering.
   a. Describe the rules of lettering.
   Related Academic Topics: (See Appendix A): C1, C4, C6, M1
   Workplace Skills (See Appendix B): WP2
11. Construct uppercase gothic letters and numerals.
   a. Demonstrate uppercase gothic letters and numerals.
   Related Academic Topics: (See Appendix A): C1, C4, C6, M1
   Workplace Skills (See Appendix B): WP2
12. Match and identify basic geometric shapes and terms.
   a. Match geometric terms with their definition.
   b. Identify basic geometric shapes.
   Related Academic Topics (See Appendix A): C1, C6, M5, S8
   Workplace Skills (See Appendix B): WP1, WP2, WP6
13. Construct various geometric shapes using constructional techniques.
   a. Bisect a line and arc.
   b. Bisect an angle.
   c. Construct a perpendicular line from a point to a line.
   d. Divide a line into equal parts.
   e. Draw an arc tangent to a straight line and an arc.
   f. Draw an arc tangent to two arcs.
   g. Construct an octagon.
   h. Construct a hexagon.
   i. Construct a line parallel to a given line.
   Related Academic Topics (See Appendix A): C1, C6, M5, S8
   Workplace Skills (See Appendix B): WP1, WP2, WP6
14. Match orthographic terms with definitions.
   a. Match terms of orthographic projections with their definitions.
   Related Academic Topics (See Appendix A): C1, C2, C6, M2, M5
   Workplace Skills (See Appendix B): WP2, WP6
15. Demonstrate the ability to describe principal views possible in orthographic projection.
   a. Describe principal views in orthographic projection.
   Related Academic Topics (See Appendix A): C1, C2, C6, M2, M5
   Workplace Skills (See Appendix B): WP2, WP6
16. Demonstrate the ability to construct principal views in orthographic projection.
   a. Construct top view with front and right sides given.
   b. Construct front view with top and right sides given.

c. Construct right side with top and front views given.
d. Construct a 3-view drawing from a pictorial.

Related Academic Topics (See Appendix A): C1, C2, C6, M2, M5
Workplace Skills (See Appendix B): WP2, WP6

17. Demonstrate the ability to use CAD hardware and software.
    a. Match CAD hardware/software terms with definitions.
    b. Demonstrate care and maintenance of computer software/hardware.
    c. Start up/shut down CAD system.
    d. Load CAD program and save drawing on hard drive and floppy disk.
    e. Operate plotter/printer.

    Related Academic Topics (See Appendix A): C1, C4, C6, M5, S8
    Workplace Skills (See Appendix B): WP2, WP5, WP6
18. Construct orthographic and pictorial drawings on the CAD system.
    a. Construct an orthographic drawing on the CAD system.
    b. Construct a pictorial drawing on the CAD system.

    Related Academic Topics (See Appendix A): C1, C4, C6, M5, S8
    Workplace Skills (See Appendix B): WP2, WP5, WP6
19. Demonstrate the ability to apply techniques of dimensioning.
    a. Apply basic line types used in dimensioning.
    b. Demonstrate use of aligned and unidirectional systems.
    c. Apply rules for dimensioning techniques.
    d. Identify and locate finish marks on drawings.
    e. Explain the purpose for notations on drawings.
    f. Describe machine processes.

    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M5
    Workplace Skills (See Appendix B): WP2, WP3
20. Describe and draw threads.
    a. Describe uses of threads.
    b. Describe types of thread forms.
    c. Interpret thread notes.
    d. Describe methods of thread representation.
    e. Draw an internal and external thread form.

    Related Academic Topics (See Appendix A): C1, C4
    Workplace Skills (See Appendix B): WP2, WP6
21. Describe the techniques and types of sectional views.
    a. Identify types of section views.
    b. Describe the techniques for developing sectional views.

    Related Academic Topics (See Appendix A): C1, C2, C6
    Workplace Skills (See Appendix B): WP2, WP6
22. Construct sectional views.
    a. Construct full sections.
    b. Construct half sections.

    Related Academic Topics (See Appendix A): C1, C2, C6, M1
    Workplace Skills (See Appendix B): WP2, WP6

23. Demonstrate the ability to construct primary auxiliary views.
    a. Discuss the methods of constructing primary auxiliary views.
    b. Construct a primary auxiliary view.
    Related Academic Topics (See Appendix A): C1, C4, C6, M1
    Workplace Skills (See Appendix B): WP2, WP6
24. Demonstrate the ability to list and describe the different types of pictorial drawings.
    a. List the different types of pictorial drawings.
    b. Describe the differences in pictorial drawings.
    Related Academic Topics (See Appendix A): C1, C4, C6, M1
    Workplace Skills (See Appendix B): WP2, WP6
25. Construct pictorial drawings.
    a. Construct an isometric drawing.
    b. Construct an oblique drawing.
    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1
    Workplace Skills (See Appendix B): WP2, WP6
26. Describe local program and vocational center policies and procedures.
    a. Describe local program and vocational center policies and procedures including dress code, attendance, academic requirements, discipline, and transportation regulations.
    Related Academic Topics (See Appendix A): C1, C4, C6
    Workplace Skills (See Appendix B): WP2, WP3, WP6
27. Describe employment opportunities and responsibilities.
    a. Describe employment opportunities including potential earnings, employee benefits, job availability, places of employment, working conditions, and educational requirements.
    b. Describe basic employee responsibilities.
    Related Academic Topics (See Appendix A): C1, C4, C6
    Workplace Skills (See Appendix B): WP2, WP3, WP6
28. Describe personal safety rules for working in the drafting industry.
    a. Identify and apply terms and definitions for safety.
    b. Identify OSHA inspections and citations.
    c. Identify accidents including causes and prevention.
    d. Identify general safety procedures.
    e. Identify causes of electrical hazards.
    f. Identify proper methods for moving heavy items.
    g. Identify and apply emergency first aid, if necessary.
    Related Academic Topics (See Appendix A): C1, C4, C5
    Workplace Skills (See Appendix B): WP2, WP3
29. Develop advanced leadership and organizational skills.
    a. Identify VICA leadership and skills competition activities.
    b. Identify similarities between VICA leadership skills and workplace leadership skills.

Related Academic Topics (See Appendix A): C5, C6
Workplace Skills (See Appendix B): WP1, WP3, WP6

30. Develop employability skills.
    a. Prepare a resume containing essential information.
    b. Complete a job application form.
    c. Explain procedures for job interviews using correct job etiquette.
    d. Demonstrate the role of an applicant in a job interview.

    Related Academic Topics (See Appendix A): C1, C3, C4, C6
    Workplace Skills (See Appendix B): WP2, WP3, WP6
31. Demonstrate the ability to describe the functions and organization of the architectural profession.
    a. Describe architectural drafting terms.
    b. Prepare a report on architectural drafting.
    c. Match job titles with qualifications, responsibilities, and legal requirements for entering the architectural drafting field.

    Related Academic Topics (See Appendix A): C1, C4, C5
    Workplace Skills (See Appendix B): WP2
32. Demonstrate the ability to produce sketches in planning the three main residential areas.
    a. Describe requirements for the three main residential areas.
    b. Sketch rooms including service, living, and sleeping areas, and floor plan.

    Related Academic Topics (See Appendix A): C1, C4, C6, M1
    Workplace Skills (See Appendix B): WP2, WP6
33. Demonstrate the ability to describe the structural systems and construction materials.
    a. Define structural systems and building materials terms.
    b. Identify symbols on plan, elevation, and/or section drawings.

    Related Academic Topics (See Appendix A): C1, C2, C4
    Workplace Skills (See Appendix B): WP2
34. Demonstrate the skills necessary for producing an architecturally correct floor plan.
    a. Interpret measurements using architect's scale.
    b. Construct architectural letters.
    c. Draw and dimension a floor plan.

    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1, M4, S6
    Workplace Skills (See Appendix B): WP2, WP6
35. Demonstrate the ability to produce an architecturally correct foundation plan.
    a. Draw a foundation plan.

    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1, M4, S6
    Workplace Skills (See Appendix B): WP2, WP6
36. Demonstrate the ability to produce an electrical plan.
    a. Draw an electrical plan.

    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1, M4, S6
    Workplace Skills (See Appendix B): WP2, WP6

37. Demonstrate the ability to produce elevation drawings.
    a. Draw an elevation plan.
    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1, M4, S6
    Workplace Skills (See Appendix B): WP2, WP6
38. Demonstrate the ability to draw, dimension, and label an exterior wall section.
    a. Draw a typical exterior wall section.
    b. Dimension and label a typical exterior wall section.
    Related Academic Topics (See Appendix A): C1, C3, C4, C6
    Workplace Skills (See Appendix B): WP2, WP3, WP6
39. Develop a floor plan by utilizing a microcomputer.
    a. Draw, dimension, and plot a floor plan using a microcomputer.
    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1, M4
    Workplace Skills (See Appendix B): WP2, WP6
40. Develop architectural elevations using a microcomputer.
    a. Draw elevations using a microcomputer.
    Related Academic Topics (See Appendix A): C1, C2, C4, C6, M1, M4
    Workplace Skills (See Appendix B): WP2, WP6
41. Develop the skills needed to operate a plotter/printer.
    a. Operate a plotter/printer.
    Related Academic Topics (See Appendix A): C1, C4, C6, M1
    Workplace Skills (See Appendix B): WP2, WP5, WP6
42. Demonstrate the ability to utilize the basic elements of civil drafting.
    a. Describe civil drafting terms.
    b. Match job titles with qualifications, responsibilities, and licensing/bonding requirements.
    Related Academic Topics (See Appendix A): C1, C4, C6
    Workplace Skills (See Appendix B): WP2, WP6
43. Develop a plot/site plan.
    a. Draw a plot/site plan.
    Related Academic Topics (See Appendix A): C1, C4, C6, M1
    Workplace Skills (See Appendix B): WP2, WP6
44. Demonstrate the ability to apply information on the plumbing and HVAC profession.
    a. Describe plumbing and HVAC terms.
    b. Match job titles with qualifications, responsibilities, and licensing/bonding requirements.
    Related Academic Topics (See Appendix A): C1, C4, C6
    Workplace Skills (See Appendix B): WP2, WP6
45. Demonstrate the ability to draw a basic plumbing plan.
    a. Draw a basic plumbing schematic for a residential building.
    Related Academic Topics (See Appendix A): C1, C4, C6
    Workplace Skills (See Appendix B): WP2, WP6
46. Demonstrate the ability to draw a basic HVAC plan for a residential building.
    a. Draw a basic HVAC plan for a residential building.

Related Academic Topics (See Appendix A): C1, C4, C6
Workplace Skills (See Appendix B): WP2, WP6

47. Describe a basic residential wiring plan.
    a. Describe electrical terms.
    b. Match job titles with qualifications, responsibilities, and licensing/bonding requirements.

Related Academic Topics (See Appendix A): C1, C4, C6
Workplace Skills (See Appendix B): WP2, WP6

48. Demonstrate the ability to develop a basic residential wiring plan.
    a. Draw a basic electrical schematic.

Related Academic Topics (See Appendix A): C1, C4, C6, M1, S6
Workplace Skills (See Appendix B): WP2, WP6

SECTION II:

CURRICULUM GUIDE

FOR

CIVIL TECHNOLOGY

CIVIL TECHNOLOGY COURSES

Course Name: Road Design and Construction Methods and Materials

Course Abbreviation: CIT 1213

Classification: Vocational-Technical Core

Description: A study of equipment, construction methods, and materials used in the construction of roadways and drainage structures. (3 sch: 3 hr. lecture)

Pre/Corequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to identify the types of road construction methods and equipment.
   a. Describe the nature, properties, and use of road construction materials and equipment.
   b. Discuss the principles of roadbed construction.
   c. Explain the environmental impact of highways.
   d. Describe the techniques of highway maintenance and rehabilitation.
   e. Explain the construction of cuts and fills.
   f. Calculate topping or base quantities.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP6
2. Demonstrate the ability to identify the types of drainage structure, construction methods, and materials.
   a. Describe the nature, properties, and use of drainage structure materials and equipment.
   b. Describe the construction procedures and processes of drawing drainage and structures.
   c. Calculate grade cutoff of pilings.
   d. Calculate flow line of drainage structures.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Route Surveying

Course Abbreviation: CIT 1114

Classification: Vocational-Technical Core

Description: This course teaches highway route design and factors in route location. The calculation and layout of simple horizontal and vertical curves, grades, and related earthwork are covered. Modern surveying, measuring, and mapping instruments, including electronic total stations with data collectors, are used. Photogrammetry principles and applications are studied in a practical setting. (4 sch: 2 hr. lecture, 4 hr. lab)

Prerequisites: Elementary Surveying (DDT 1413)

Competencies and Suggested Objectives:

1. Develop the ability to lay out highways and transportation routes.
   a. Calculate and stake circular curves.
   b. Calculate and stake vertical curves.
   c. Calculate and stake construction grades.
   d. Calculate quantities from profiles and cross sections.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Road Construction Plans and Specifications

Course Abbreviation: CIT 1223

Classification: Vocational-Technical Core

Description: A course to provide students with an introduction to the plans and specifications for the construction of streets and highways. Includes instruction in the interpretation of plans and specifications, the bidding process, and calculation of material and labor costs. (3 sch: 3 hr. lecture)

Prerequisites: None

Competencies and Suggested Objectives:

1. Develop the ability to interpret and develop construction prints.
   a. Read and interpret typical construction blueprints.
   b. Read and interpret symbols, layout, and organizations of plans and specifications.
   c. Discuss the development of site construction plans and specifications.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to apply principles of contracts.
   a. Describe the bidding procedure of competitive and negotiated contracts.
   b. Identify the parties involved in the construction process.
   c. Compute the costs of material and labor required to complete a simple road construction contract.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Land Surveying Lab

Course Abbreviation: CIT 2434

Classification: Vocational-Technical Core

Description: This course teaches aspects of boundary controls, principles for land surveying, methods of land boundary location, and land description in accordance with original surveys and resurveys. (4 sch: 8 hr. lab)

Prerequisites: Elementary Surveying (DDT 1413)

Competencies and Suggested Objectives:

1. Demonstrate the ability to make and record measurements.
   a. Chain a distance, record measurements, and make pertinent notes.
   b. Complete a level traverse circuit, record, and plot data.
   c. Read angular measurements and record data.
   d. Run a transit stadia traverse requiring elevations, traverse points, and locations of major details.
   e. Establish a square grid system-run level and record data.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M1, M2, M4, M5, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to compute survey data.
   a. Compute grade percentages from established data.
   b. Compute horizontal curve from established data.
   c. Determine traverse computations.
   d. Calculate distances in a specified geographical area from field notes using appropriate geometric principles.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M1, M2, M4, M5, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to complete a given survey.
   a. Survey a given area.
   b. Resurvey a given area to determine accuracy.
   c. Subdivide property using total stations and data collector.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, M1, M2, M4, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6

Course Name: Legal Principles of Surveying

Course Abbreviation: CIT 2113

Classification: Vocational-Technical Core

Description: A study of the legal aspects of boundary controls for the survey and resurvey of real property. (3 sch: 2 hr. lecture, 2 hr. lab)

Corequisites: Land Surveying Lab (CIT 2434)

Competencies and Suggested Objectives:

1. Demonstrate the ability to apply the principles of the legal aspects of surveying.
   a. Define legal terms as used in surveying.
   b. Describe the legal aspects of boundary control.
   c. Prepare survey plats.
   d. Write a legal description of real property.
   e. Research public records for property descriptions.
   f. Explain the development of public land surveys.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Develop the ability to comply with the minimum standards for land surveying and land surveyor registration requirements set by the State of Mississippi.
   a. Discuss the legal authority and liability of the land surveyor.
   b. Apply Code of Ethics in work situations.
   c. Explain the surveyor's rights, duties, and liabilities.
   d. List the minimum standards for land surveying in Mississippi.
   e. Discuss land surveying registration laws and examinations in Mississippi.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: GPS/GIS Surveying

Course Abbreviations: CIT 2424

Classification: Vocational-Technical Core

Description: This course teaches principles of surveying utilizing artificial earth orbit satellites and digitizing the information obtained to establish a useful database. (4 sch: 3 hr. lecture, 2 hr. lab)

Prerequisites: Elementary Surveying (DDT 1413), Route Surveying (CIT 1114), and Land Surveying Lab (CIT 2434)

Competencies and Suggested Objectives:

1. Demonstrate an ability to use GPS equipment and convert to the GIS system.
   a. Define terminology.
   b. Transfer data between CAD and GIS systems.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Develop the ability to define and utilize data generated by Geographical Information Systems (GIS) .
   a. Define how GPS/GIS is specifically designed for spatial analysis to fully analyze geographic data.
   b. Define GPS/GIS used in federal and state government, utilities, private engineering consulting firms, and corporations.
   c. Perform the linking of non-graphic map attribute data to graphic map data in a GIS.
   d. Describe the duties of GIS manager, GIS database manager, cartographer, system manager, and programmer.
   e. Apply factors that affect the choice of scale for GIS base map.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Advanced Surveying Practices

Course Abbreviation: CIT 2124

Classification: Vocational-Technical Elective

Description: A course designed to provide the student with practical applications of skills and knowledge gained in other surveying and related courses. (4 sch: 2 hr. lecture, 4 hr. lab)

Prerequisites: Elementary Surveying (DDT 1413), Route Surveying (CIT 1114), and Land Surveying Lab (CIT 2434)

Competencies and Suggested Objectives:

1. Demonstrate the ability to design and perform the necessary layout of private properties and/or commercial sites according to city, county, state, and/or federal regulations.
   a. Obtain preliminary field data.
   b. Create preliminary design using horizontal curves and cul-de-sacs.
   c. Create a finished design according to specifications.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Soil Mechanics

Course Abbreviation: CIT 2313

Classification: Vocational-Technical Elective

Description: Elementary study of exploring, sampling, testing, and evaluating sub-surface materials and their effect on types of foundations and construction. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Develop the ability to index and classify soils.
   a. Define terms used in indexing and classifying of soils.
   b. Describe tests utilized in testing soils.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to perform soil tests.
   a. Conduct a plastic limit test.
   b. Conduct a liquid limit test.
   c. Conduct a proctor test.
   d. Conduct a sand cone test.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Concrete and Hot-Mix Asphalt Testing

Course Abbreviation: CIT 2413

Classification: Vocational-Technical Elective

Description: A course which emphasizes standard procedures for sampling, testing, and evaluating materials used in concrete and hot-mix asphalt mixtures. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to sample, test, and evaluate concrete mixtures.
   a. Describe the characteristics and functions of concrete ingredients including additives.
   b. Perform aggregate tests.
   c. Describe properties of fresh concrete.
   d. Proportion concrete mixes.
   e. Describe the procedures for placing and curing of concrete.
   f. Perform strength of concrete tests using concrete cylinders.
   h. Identify and describe concrete construction forms and joints.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to sample, test, and evaluate hot-mix asphalt mixtures.
   a. Describe the characteristics and functions of hot-mix asphalt ingredients.
   b. Identify and describe hot-mix design criteria.
   c. Perform mineral aggregate tests for hot-mix asphalt mixtures.
   d. Perform the Marshall test for hot-mix asphalt.
   e. Identify and explain the hot-mix asphalt manufacture procedures.
   f. Identify and explain the hot-mix asphalt paving procedures.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Water and Water Distribution

Course Abbreviation: CIT 2513

Classification: Vocational-Technical Elective

Description: A study of the hydrological principles in the distribution and movement of water on and under the earth's surface and in water distribution systems. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to describe water wells.
   a. Identify and describe basic hydraulic and hydrological terms.
   b. Describe the standards which determine where water wells or water distribution sources are located, designed, or constructed.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to calculate various hydrological units.
   a. Calculate pressure-velocity-head relationships.
   b. Calculate gravity flow in pipes.
   c. Calculate flow in pipes under pressure.
   d. Calculate flow in pipe networks.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to determine various hydrological events.
   a. Distinguish between natural and man-made hydrological cycles.
   b. Describe the relationship between rainfall, surface water, and water availability.
   c. Estimate surface water or storm runoff.
   d. Explain the relationship between droughts and reservoirs.
   e. Describe the principles of groundwater flow.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Special Project

Course Abbreviation: CIT 291(1-3)

Classification: Vocational-Technical Elective

Description: A course designed to provide the student with practical application of skills and knowledge gained in other Civil Technology courses. The instructor works closely with the student to insure that the selection of a project will enhance the student's learning experience. (1-3 sch: 2-6 hr. lab)

Prerequisites: Minimum of 12 sch Civil Technology related courses

Competencies and Suggested Objectives:

1. Develop a written plan which details the activities and projects to be completed.
   a. Utilize a written plan which details the activities and projects to be completed.
   b. Perform written occupational objectives in the special project.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6
2. Assess accomplishment of objectives.
   a. Prepare a daily written assessment of accomplishment of objectives.
   b. Present weekly written reports to instructor in activities performed and objectives accomplished.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6
3. Utilize a set of written guidelines for the special project.
   a. Develop a set of written guidelines for the special project.
   b. Follow the guidelines throughout the project development.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1, WP6

Course Name: Work-Based Learning in Civil Technology

Course Abbreviation: CIT 292(1-6)

Classification: Vocational-Technical Elective

Description: This course is a cooperative program between industry and education and is designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of one semester hour per 45 industrial contact hours. (1-6 sch: 3-18 hr. externship)

Prerequisites: Consent of instructor and the completion of at least one semester of advanced coursework in the civil technology program.

Competencies and Suggested Objectives:

1. Apply technical skills needed to be a viable member of the work force.
   a. Prepare a description of technical skills to be developed in the work-based learning program.
   b. Develop technical skills needed to be a viable member of the work force.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP1
2. Apply skills developed in other program area courses.
   a. Perform skills developed in other program area courses in the work-based learning program.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP5, WP6
3. Apply human relationship skills.
   a. Interact positively in the work-based learning program to demonstrate interpersonal skills.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP3
4. Apply and practice positive work habits and responsibilities.
   a. Perform assignments to develop positive work habits and responsibilities.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP3
5. Work with instructor and employer to develop written occupational objectives to be accomplished.
   a. Perform written occupational objectives in the work-based learning program.
   Related Academic Topics (See Appendix A): C5, C6
   Workplace Skills (See Appendix B): WP6
6. Assess accomplishment of objectives.
   a. Prepare daily written assessment of accomplishment of objectives.

b. Present weekly written reports to instructor in activities performed and objectives accomplished.

Related Academic Topics (See Appendix A): C5, C6
Workplace Skills (See Appendix B): WP6

7. Utilize a set of written guidelines for the work-based learning program.
   a. Develop and follow a set of written guidelines for the work-based learning program.

Related Academic Topics (See Appendix A): C5, C6
Workplace Skills (See Appendix B): WP6

RELATED VOCATIONAL-TECHNICAL COURSES

Course Name: Fundamentals of Drafting

Course Abbreviation: DDT 1114

Classification: Vocational-Technical Core (From Drafting and Design Technology)

Description: Course designed to give drafting majors the background needed for all other drafting courses. (4 sch: 2 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Discuss classroom procedures and drafting occupations.
   a. Describe proper classroom/lab procedures.
   b. Describe the various occupations in drafting and their requirements.
   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Explain and apply safety rules and regulations.
   a. Describe safety rules for drafting occupations.
   b. List and discuss hazardous materials found in the drafting area.
   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to apply proper techniques in instrument drawings.
   a. Demonstrate the ability to scale drawings.
   b. Construct various angles.
   c. Recognize and construct the different types of lines.
   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Demonstrate the ability to sketch and develop views of basic shapes.
   a. Develop a pictorial view from three principal views.
   b. Develop three principal views from a pictorial view.
   c. Complete three principal views when lines are missing.
   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
5. Demonstrate the ability to use geometric constructions.
   a. Construct tangent arcs and lines.
   b. Divide lines or arcs into equal and/or proportional parts.
   c. Develop geometric shapes.
   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
6. Demonstrate the ability to construct orthographic projections.
   a. Construct a top view, with front and right side views given.
   b. Construct a front view, with top and right side views given.

c. Construct a right side view, with top and front views given.
d. Develop a drawing consisting of three principal views.

Related Academic Topics (See Appendix A): C2, C5, C6
Workplace Skills (See Appendix B): WP2, WP5, WP6

7. Demonstrate the ability to dimension objects.
   a. Recognize lines, symbols, features, and conventions used in dimensioning.
   b. Recognize and use size and location dimensions.
   c. Recognize and use general and local notes.
   d. Dimension a drawing using contour, chain, and baseline dimensioning.

   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6
8. Demonstrate the ability to construct sectional views.
   a. Construct full and half sectional views.
   b. Recognize and construct removed, revolved, offset, and aligned sectional views.

   Related Academic Topics (See Appendix A): C2, C5, C6
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Principles of CAD

Course Abbreviation: DDT 1313

Classification: Vocational-Technical Core (From Drafting and Design Technology)

Description: This course will introduce the student to the operating system and how to perform basic drafting skills on the CAD. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to manage the operating system.
   a. Format, label, and examine the contents of floppy disks.
   b. List, erase, rename, and copy files on floppy and hard disks.
   c. Create, remove, and move files between directories and subdirectories.
   d. Set the date and time on the computer.
   e. Examine the contents of files.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to use the basic hardware of the CAD system.
   a. Input data using keyboard, graphics tablet, and mouse.
   b. Access files and/or symbols from the hard disk.
   c. Store, retrieve, copy, and delete drawings and files.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to perform drafting functions on the CAD system.
   a. Construct a drawing using the draw command.
   b. Produce a drawing utilizing the construct command.
   c. Utilize the modify commands.
   d. Utilize the settings variables.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

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Course Name: Intermediate CAD

Course Abbreviations: DDT 1323

Classification: Vocational-Technical Elective (From Drafting and Design Technology)

Description: This course is designed as a continuation of Principles of CAD. Subject areas will include dimensioning, sectional views, and symbols. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: Principles of CAD (DDT 1313)

Competencies and Suggested Objectives:

1. Demonstrate the ability to dimension drawings by the use of CAD.
   a. Draw and dimension a 2-view drawing per ANSI/ISO standards.
   b. Draw and dimension a 3-view drawing per ANSI/ISO standards.
   c. Apply dimensions using unidirectional and aligned systems of dimensions.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Draw sectional views in CAD.
   a. Draw a multiview drawing including a full section and apply section lining.
   b. Draw a multiview drawing including a half section and apply section lining.
   c. Draw a multiview drawing including an offset section and apply section lining.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Elementary Surveying

Course Abbreviation: DDT 1413

Classification: Vocational-Technical Core (From Drafting and Design Technology)

Description: Basic course dealing with principles of geometry, theory, and use of instruments, mathematical calculations, and the control and reduction of errors. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate the ability to measure and record various measurements.
   a. Describe the use of the United States Geological Survey benchmark.
   b. Measure horizontal and vertical angles.
   c. Measure horizontal and vertical distances in English and metric.
   d. Demonstrate differences in elevation between random points.
   e. Record and interpret field notes.
   f. Explain the various duties of each member of a survey party.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the use of surveying equipment, terms, and signals.
   a. Identify and explain the basic surveying equipment.
   b. Set up the equipment, shoot elevations, and record.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Advanced CAD

Course Abbreviation: DDT 2343

Classification: Vocational-Technical Elective (From Drafting and Design Technology)

Description: This course is designed as a continuation of Principles of CAD. Emphasis is placed on attributes, slide shows, the user coordinate system, 3-D faces, and solid modeling. (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: Principles of CAD (DDT 1313)

Competencies and Suggested Objectives:

1. Chart a "slide show."
   a. Create a series of slides.
   b. Use a text editor to create script file.
   c. Run a script file.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Assign attributes and generate a bill of materials.
   a. Assign visible or hidden values to blocks.
   b. Edit attributes in existing blocks.
   c. Construct a template file for the collection of block attributes.
   d. Collect attributes values in a bill of materials.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate the ability to create wire frame 3-D objects (3DFACF).
   a. Demonstrate the ability to control the "user coordinate system" (UCS).
   b. Create 3-D faces.
   c. Rotate objects.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Demonstrate the ability to create solid models.
   a. Demonstrate the ability to extrude objects.
   b. Remove hidden lines.
   c. Control the VPOINT (View Point).
   d. Extract 2-D views from 3-D objects.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Structural Drafting

Course Abbreviation: DDT 2233

Classification: Vocational-Technical Elective (From Drafting and Design Technology)

Description: Structural section, terms, and conventional abbreviations and symbols used by structural fabricators and erectors are studied. Knowledge is gained in the use of the A.I.S.C. Handbook. Problems are studied that involve structural designing and drawing of beams, columns, connections, trusses, and bracing (steel, concrete, and wood). (3 sch: 1 hr. lecture, 4 hr. lab)

Prerequisites: Fundamentals of Drafting (DDT 1114)

Competencies and Suggested Objectives:

1. Demonstrate the ability to utilize data on design of structural members.
   a. Identify and describe physical properties of materials.
   b. Read and interpret data utilizing standard references.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to construct structural plans.
   a. Draw a detail of connections of structural members including bolting and welding.
   b. Draw structural framing plans.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Mapping and Topography

Course Abbreviation: DDT 2423

Classification: Vocational-Technical Core (From Drafting and Design Technology)

Description: Selected drafting techniques are applied to the problem of making maps, traverses, plot plans, plan drawings, and profile drawings using maps, field survey data, aerial photographs, and related references and materials including symbols, notations, and other applicable standardized materials. (3 sch: 2 hr. lecture, 2 hr. lab)

Co/Prerequisites: Elementary Surveying (DDT 1413) and Intermediate CAD (DDT 1323)

Competencies and Suggested Objectives:

1. Demonstrate the ability to plan and draw a map.
   a. Explain and draw a plan and profile.
   b. Define the various maps and symbols used in mapping.
   c. Prepare a contour map.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Demonstrate the ability to transform field notes into engineering drawings.
   a. Explain what an engineering drawing is.
   b. Determine the correct scale size.
   c. Explain what information is needed from the field notes to complete a drawing.
   d. Complete a drawing from field notes.

   Related Academic Topics (See Appendix A): C2, C3, C5, C6, M2, M3, M5, M7, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Professional Development

Course Abbreviation: BOT 1213

Classification: Related Vocational-Technical (From Business and Office and Related Technology Cluster)

Description: This course develops an awareness of interpersonal skills essential for job success. Topics include positive self-image, professional image, work ethics, time and stress management, and human relations skills. (3 sch: 3 hr. lecture)

Prerequisites: None

Competencies and Suggested Objectives:

1. Formulate personal, educational, and professional goals and develop a plan to accomplish those goals.
   a. Develop a plan for personal, educational, and professional growth.
   b. Discuss the necessity of lifelong learning.
   c. List the benefits of professional affiliations and certification programs.
   d. Discuss the advantages of membership and participation in professional organizations.
   e. Begin preparations for the job application process.

   Related Academic Topics (See Appendix A): C1, C3
   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP6
2. Demonstrate an understanding of how interpersonal skills affect personal and professional development.
   a. Apply techniques to improve listening, verbal, and nonverbal communication skills.
   b. Discuss interpersonal skills essential to successful communications with people from diverse cultural and international backgrounds and with the differently-abled.
   c. Apply business etiquette skills in professional situations.
   d. Apply problem-solving and conflict-resolution skills.

   Related Academic Topics (See Appendix A): C1, C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP1, WP2, WP3, WP6
3. Identify and discuss personal and professional factors associated with job success.
   a. Identify techniques that will build a positive self-image.
   b. Project a professional image by applying the basics of good health practices and personal grooming and selecting a proper business wardrobe.

c. Discuss principles of effective time and stress management.
Related Academic Topics (See Appendix A): C1, C3, C5, C6, S1, S8
Workplace Skills (See Appendix B): WP1, WP2, WP3, WP6

Course Name: Real Property I

Course Abbreviation: LET 2453

Classification: Related Vocational-Technical (From Business and Office and Related Technology Cluster)

Description: This course is an introduction to real property law including ownership and transfer, employing ethics. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Demonstrate knowledge of types of ownership and type of interest in real property.
   a. Outline the methods of acquiring ownership to real property.
   b. Draft a co-tenancy agreement regarding property rights.
   Related Academic Topics (See Appendix A): C1, C2, C4, C5
   Workplace Skills (See Appendix B): WP2, WP4, WP6
2. Demonstrate knowledge of surveys, land descriptions, encumbrances, and easements.
   a. Given a hypothetical situation, locate errors in a survey and plot a land description.
   b. Differentiate encumbrances and easements.
   Related Academic Topics (See Appendix A): C1, C2, C4, C5, M1, M2, M4, M7
   Workplace Skills (See Appendix B): WP2, WP4, WP6
3. Demonstrate a basic understanding of contracts.
   a. List the requirements of a valid contract.
   b. Explain the remedies for breach of contracts.
   c. Prepare a contract.
   Related Academic Topics (See Appendix A): C1, C2, C4, C5
   Workplace Skills (See Appendix B): WP2, WP4, WP6
4. Demonstrate an understanding of deeds.
   a. Explain the various types of deeds to include warranty, special warranty, and quit claim.
   b. Discuss the basic requirements of a deed.
   c. Prepare valid deeds as listed above.
   Related Academic Topics (See Appendix A): C1, C2, C4, C5
   Workplace Skills (See Appendix B): WP2, WP4, WP6

SECTION III:

RECOMMENDED TOOLS AND EQUIPMENT

RECOMMENDED TOOLS AND EQUIPMENT FOR CIVIL TECHNOLOGY

1. CAD stations with current release AutoCad and civil engineering software (20)
2. Plotters (2)
3. Inkjet printers/laser printers (5)
4. Flat files (30)
5. 4 ft. x 12 ft. lab tables with chemistry comparable tops, base and top (9)
6. Paper cutters (2)
7. CAD station desk with chairs (20)
8. Total station with data collector, software, and accessories to include solar observation capabilities (1 per 4 students)
9. Pipe laser system and accessories (1)
10. Land leveling laser system and accessories (1)
11. GPS base station with software including data collector (1 per 4 students)
12. Levels with tripods and elevation rods both in English and Metric units (1 per 4 students)
13. Surveying accessories, prism pole with prisms, 25 ft. tapes in both English and Metric units (2 per total station)
14. Hammers (2 pound) (1 per 4 students)
15. Radio (1 per student)
16. Plumb bobs with sheath and string (2 per student)
17. Programmable calculator with surveying card (1 per student)
18. 100 ft. reel engineer's tape (2)
19. 66 ft. Gunter's chain (2)
20. 100 ft. engineer's rope (2)
21. 100 ft. engineer's tape (2)
22. Sets of surveyor arrows with holders (10)
23. Roto-tape in English units (1)
24. Roto-tape in Metric units (1)
25. Time-cube radio (for WWV time) (1)
26. Bush axe (2)
27. Bush blades (2)
28. Blueprint machine (1)
29. Metal detector (1)

ASPHALT

1. Bench ovens (2)
2. Large floor oven (1)
3. Bench mixer with asphalt attachments (1)
4. Sieve master sieve shaker (1)
5. Set of coarse sieves (1)
6. Set of fine sieves (1)
7. Manual Marshall set (1)

8. Mechanical Marshall set (1)
9. Water bath (1)
10. Hot plates (2)
11. Specific gravity set (1)
12. Vacuum pump (1)

SOILS

1. Liquid limit device set (1 per 2 students)
2. Plastic limit set (1 per 2 students)
3. Proctor set (1 per student)
4. Sand cone set (1 per student)
5. Specific gravity set (1 per student)
6. Microwave oven (1)

CONCRETE

1. Laboratory concrete mixer (1)
2. Concrete cylinder compression machine (1)
3. Concrete air meter (1)
4. Sieve shaker for 8 in. sieves (1)
5. Sieves for fine sieve analysis, 8 in. (2 sets)
6. Sieves for coarse sieve analysis, 8 in. (2 sets)
7. Specific gravity set for fine (1 per student)
8. Specific gravity set for coarse (1 per student)
9. Curing tank for concrete cylinders (1)
10. Laboratory vibrator (1)
11. Concrete cylinder micrometer (1)
12. AASHO standards (2 sets)
13. Metal storage cabinet (1)
14. Capping sets (2)
15. Stop watches (2)
16. Air compressor, 2½ hp (1)

RECOMMENDED INSTRUCTIONAL AIDS

1. Cart, AV (for overhead projector) (1)
2. Cart, AV (for TV-VCR) (1)
3. Computer with operating software with multimedia kit (1)
4. Projector, overhead (1)
5. TV-VCR (1)
6. Video out (Microcomputer to TV monitor) (1)

APPENDIX A:

RELATED ACADEMIC TOPICS

APPENDIX A

RELATED ACADEMIC TOPICS FOR COMMUNICATIONS

C1 Interpret written material.
C2 Interpret visual materials (maps, charts, graphs, tables, etc.).
C3 Listen, comprehend, and take appropriate actions.
C4 Access, organize, and evaluate information.
C5 Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
C6 Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.

EXPANDED TOPICS FOR COMMUNICATIONS

TOPIC C1: Interpret written material.

C1.01 Read and follow complex written directions.
C1.02 Recognize common words and meanings associated with a variety of occupations.
C1.03 Adjust reading strategy to purpose and type of reading.
C1.04 Use sections of books and reference sources to obtain information.
C1.05 Compare information from multiple sources and check validity.
C1.06 Interpret items and abbreviations used in multiple forms.
C1.07 Interpret short notes, memos, and letters.
C1.08 Comprehend technical words and concepts.
C1.09 Use various reading techniques depending on purpose for reading.
C1.10 Find, read, understand, and use information from printed matter or electronic sources.

TOPIC C2: Interpret visual materials (maps, charts, graphs, tables, etc.).

C2.01 Use visuals in written and in oral presentations.
C2.02 Recognize visual cues to meaning (layout, typography, etc.).
C2.03 Interpret and apply information using visual materials.

TOPIC C3: Listen, comprehend, and take appropriate action.

C3.01 Identify and evaluate orally-presented messages according to purpose.
C3.02 Recognize barriers to effective listening.
C3.03 Recognize how voice inflection changes meaning.
C3.04 Identify speaker signals requiring a response and respond accordingly.
C3.05 Listen attentively and take accurate notes.
C3.06 Use telephone to receive information.

C3.07 Analyze and distinguish information from formal and informal oral presentations.

TOPIC C4: Access, organize, and evaluate information.

C4.01 Distinguish fact from opinion.
C4.02 Use various print and non-print sources for specialized information.
C4.03 Interpret and distinguish between literal and figurative meaning.
C4.04 Interpret written or oral communication in relation to context and writer's point of view.
C4.05 Use relevant sources to gather information for written or oral communication.

TOPIC C5: Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.

C5.01 Select appropriate words for communication needs.
C5.02 Use reading, writing, listening, and speaking skills to solve problems.
C5.03 Compose inquiries and requests.
C5.04 Write persuasive letters and memos.
C5.05 Edit written reports, letters, memos, and short notes for clarity, correct grammar, and effective sentences.
C5.06 Write logical and understandable statements, phrases, or sentences for filling out forms, for correspondence or reports.
C5.07 Write directions or summaries of processes, mechanisms, events, or concepts.
C5.08 Select and use appropriate formats for presenting reports.
C5.09 Convey information to audiences in writing.
C5.10 Compose technical reports and correspondence that meet accepted standards for written communications.

TOPIC C6: Communicate ideas and information using oral and written forms for a variety of audiences and purposes.

C6.01 Give complex oral instructions.
C6.02 Describe a business or industrial process/mechanism.
C6.03 Participate effectively in group discussions and decision making.
C6.04 Produce effective oral messages utilizing different media.
C6.05 Explore ideas orally with partners.
C6.06 Participate in conversations by volunteering information when appropriate and asking relevant questions when appropriate.
C6.07 Restate or paraphrase a conversation to confirm one's own understanding.
C6.08 Gather and provide information utilizing different media.

C6.09 Prepare and deliver persuasive, descriptive, and demonstrative oral presentations.

RELATED ACADEMIC TOPICS FOR MATHEMATICS

M1 Relate number relationships, number systems, and number theory.
M2 Explore patterns and functions.
M3 Explore algebraic concepts and processes.
M4 Explore the concepts of measurement.
M5 Explore the geometry of one-, two-, and three-dimensions.
M6 Explore concepts of statistics and probability in real world situations.
M7 Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

EXPANDED TOPICS FOR MATHEMATICS

TOPIC M1: Relate number relationships, number systems, and number theory.

M1.01 Understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific notation) in real world and mathematical problem situations.
M1.02 Develop number sense for whole numbers, fractions, decimals, integers, and rational numbers.
M1.03 Understand and apply ratios, proportions, and percents in a wide variety of situations.
M1.04 Investigate relationships among fractions, decimals, and percents.
M1.05 Compute with whole numbers, fractions, decimals, integers, and rational numbers.
M1.06 Develop, analyze, and explain procedures for computation and techniques for estimations.
M1.07 Select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
M1.08 Use computation, estimation, and proportions to solve problems.
M1.09 Use estimation to check the reasonableness of results.

TOPIC M2: Explore patterns and functions.

M2.01 Describe, extend, analyze, and create a wide variety of patterns.
M2.02 Describe and represent relationships with tables, graphs, and rules.
M2.03 Analyze functional relationships to explain how a change in one quantity results in a change in another.
M2.04 Use patterns and functions to represent and solve problems.
M2.05 Explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations.

M2.06 Use a mathematical idea to further their understanding of other mathematical ideas.

M2.07 Apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, and business.

TOPIC M3: Explore algebraic concepts and processes.

M3.01 Represent situations and explore the interrelationships of number patterns with tables, graphs, verbal rules, and equations.

M3.02 Analyze tables and graphs to identify properties and relationships and to interpret expressions and equations.

M3.03 Apply algebraic methods to solve a variety of real world and mathematical problems.

TOPIC M4: Explore the concepts of measurement.

M4.01 Estimate, make, and use measurements to describe and compare phenomena.

M4.02 Select appropriate units and tools to measure to the degree of accuracy required in a particular situation.

M4.03 Extend understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass.

M4.04 Understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs.

TOPIC M5: Explore the geometry of one-, two-, and three-dimensions.

M5.01 Identify, describe, compare, and classify geometric figures.

M5.02 Visualize and represent geometric figures with special attention to developing spatial sense.

M5.03 Explore transformations of geometric figures.

M5.04 Understand and apply geometric properties and relationships.

M5.05 Classify figures in terms of congruence and similarity and apply these relationships.

TOPIC M6: Explore the concepts of statistics and probability in real world situations.

M6.01 Systematically collect, organize, and describe data.

M6.02 Construct, read, and interpret tables, charts, and graphs.

M6.03 Develop an appreciation for statistical methods as powerful means for decision making.

M6.04 Make predictions that are based on exponential or theoretical probabilities.

M6.05 Develop an appreciation for the pervasive use of probability in the real world.

TOPIC M7: Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

M7.01 Use computers and/or calculators to process information for all mathematical situations.
M7.02 Use problem-solving approaches to investigate and understand mathematical content.
M7.03 Formulate problems from situations within and outside mathematics.
M7 04 Generalize solutions and strategies to new problem situations.

RELATED ACADEMIC TOPICS FOR SCIENCE

S1 Explain the Anatomy and Physiology of the human body.
S2 Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.
S3 Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.
S4 Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.
S5 Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.
S6 Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.
S7 Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance, population genetics, the structure and function of DNA, and current applications of DNA technology.
S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

EXPANDED TOPICS FOR SCIENCE

TOPIC S1: Explain the Anatomy and Physiology of the human body.

S1.01 Recognize common terminology and meanings.
S1.02 Explore the relationship of the cell to more complex systems within the body.

S1.03 Summarize the functional anatomy of all the major body systems.
S1.04 Relate the physiology of the major body systems to its corresponding anatomy.
S1.05 Compare and contrast disease transmission and treatment within each organ system.
S1.06 Explore the usage of medical technology as related to human organs and organ systems.
S1.07 Explain the chemical composition of body tissue.

TOPIC S2: Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.

S2.01 Identify the major types and structures of plants, viruses, monera, algae protista, and fungi.
S2.02 Explain sexual and asexual reproduction.
S2.03 Describe the ecological importance of plants as related to the environment.
S2.04 Analyze the physical chemical and behavioral process of a plant.

TOPIC S3: Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.

S3.01 Explain the morphology, anatomy, and physiology of animals.
S3.02 Describe the characteristics, behaviors, and habitats of selected animals.

TOPIC S4: Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.

S4.01 Examine minerals and their identification, products of the rock cycle, byproducts of weathering, and the effects of erosion.
S4.02 Relate the Hydrologic Cycle to include groundwater its zones, movement, and composition; surface water systems, deposits, and runoff.
S4.03 Consider the effects of weather and climate on the environment.
S4.04 Examine the composition of seawater; wave, tides, and currents; organisms, environment, and production of food; energy, food and mineral resources of the oceans.

TOPIC S5: Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.

S5.01 Examine the science of chemistry to include the nature of matter, symbols, formulas and nomenclature, and chemical equations.

S5.02 Identify chemical reactions including precipitation, acids-bases, and reduction-oxidation.
S5.03 Explore the fundamentals of chemical bonding and principles of equilibrium.
S5.04 Relate the behavior of gases.
S5.05 Investigate the structure, reactions, and uses of organic compounds; and investigate nuclear chemistry and radiochemistry.

TOPIC S6: Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.

S6.01 Examine fundamentals of motion of physical bodies and physical dynamics.
S6.02 Explore the concepts and relationships among work, power, and energy.
S6.03 Explore principles, characteristics, and properties of electricity, magnetism, light energy, thermal energy, and wave energy.
S6.04 Identify principles of modern physics related to nuclear physics.

TOPIC S7: Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance; population genetics, the structure and function of DNA, and current applications of DNA technology.

S7.01 Examine principles, techniques, and patterns of traits and inheritance in organisms.
S7.02 Apply the concept of population genetics to both microbial and multicellular organism.
S7.03 Identify the structure and function of DNA and the uses of DNA technology in science, industry, and society.

TOPIC S8: Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

S8.01 Apply the components of scientific processes and methods in classroom and laboratory investigations.
S8.02 Observe and practice safe procedures in the classroom and laboratory.
S8.03 Demonstrate proper use and care for scientific equipment.
S8.04 Investigate science careers, and advances in technology.
S8.05 Communicate results of scientific investigations in oral, written, and graphic form.

APPENDIX B:

WORKPLACE SKILLS

APPENDIX B
WORKPLACE SKILLS FOR THE 21ST CENTURY

WP1 Allocates resources (time, money, materials and facilities, and human resources).

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.

WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.

WP5 Selects, applies, and maintains/troubleshoots technology.

WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

APPENDIX C:

STUDENT COMPETENCY PROFILE

STUDENT COMPETENCY PROFILE FOR CIVIL TECHNOLOGY

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

Road Design and Construction Methods and Materials (CIT 1213)

_____ 1. Demonstrate the ability to identify the types of road construction methods and equipment.
_____ 2. Demonstrate the ability to identify the types of drainage structure, construction methods, and materials.

Route Surveying (CIT 1114)

_____ 1. Develop the ability to lay out highways and transportation routes.

Road Construction Plans and Specifications (CIT 1223)

_____ 1. Develop the ability to interpret and develop construction prints.
_____ 2. Demonstrate the ability to apply principles of contracts.

Land Surveying Lab (CIT 2434)

_____ 1. Demonstrate the ability to make and record measurements.
_____ 2. Demonstrate the ability to compute survey data.
_____ 3. Demonstrate the ability to complete a given survey.

Legal Principles of Surveying (CIT 2113)

_____ 1. Demonstrate the ability to apply the principles of the legal aspects of surveying.
_____ 2. Develop the ability to comply with the minimum standards for land surveying and land surveyor registration requirements set by the State of Mississippi.

GPS/GIS Surveying (CIT 2424)

_____ 1. Demonstrate an ability to use GPS equipment and convert to the GIS system.
_____ 2. Develop the ability to define and utilize data generated by Geographical Information Systems (GIS) .

Advanced Surveying Practices (CIT 2124)

_____ 1. Demonstrate the ability to design and perform the necessary layout of private properties and/or commercial sites according to city, county, state, and/or federal regulations.

Soil Mechanics (CIT 2313)

_____ 1. Develop the ability to index and classify soils.
_____ 2. Demonstrate the ability to perform soil tests.

Concrete and Hot-Mix Asphalt Testing (CIT 2413)

_____ 1. Demonstrate the ability to sample, test, and evaluate concrete mixtures.
_____ 2. Demonstrate the ability to sample, test, and evaluate hot-mix asphalt mixtures.

Water and Water Distribution (CIT 2513)

_____ 1. Demonstrate the ability to describe water wells.
_____ 2. Demonstrate the ability to calculate various hydrological units.
_____ 3. Demonstrate the ability to determine various hydrological events.

Special Project [CIT 291(1-3)]

_____ 1. Develop a written plan which details the activities and projects to be completed.
_____ 2. Assess accomplishment of objectives.
_____ 3. Utilize a set of written guidelines for the special project.

Work-Based Learning in Civil Technology [CIT 292(1-6)]

_____ 1. Apply technical skills needed to be a viable member of the work force.
_____ 2. Apply skills developed in other program area courses.
_____ 3. Apply human relationship skills.

_____ 4. Apply and practice positive work habits and responsibilities.
_____ 5. Work with instructor and employer to develop written occupational objectives to be accomplished.
_____ 6. Assess accomplishment of objectives.
_____ 7. Utilize a set of written guidelines for the work-based learning program.